

## 9. 測量計画と実施計画

### 9-1 測量計画

本作業対象地域は、ネパール王国首都カトマンドゥから西方約150kmに位置するルンビニ県全域であり、その南半分はインド国と接するタライ平野を含む平地であり、北半分は標高1,000～2,000m級の山岳地である。

本地域において、雨期（およそ6～9月）は空中写真撮影作業も含め現地作業が困難なため、乾期（およそ10～2月）の間に現地作業を実施するように計画した。

地形図の、精度は「JICA海外測量作業規程」のAクラスとした。

#### 9-1-1 測量方式の検討

##### (A) 空中写真測量（図9-1）

本地域を撮影する適期は乾期という短期間であり、撮影の可否は本作業の重要なポイントと考えられる。そのため、多少のコントラスト不調、微片の雲などは図化作業に支障がない範囲で、あまりこだわらない方針とする。また、インドとの国境付近の撮影許可が下りない場合は、約10年前に撮影された空中写真（1/50,000）を使用することとした。

写真は、広角レンズカメラ（ $f=150\text{m}$ ）を使用し、縮尺1/50,000（撮影高度7,500m）とした。なお最大比高は約2,000mくらいあるが、飛行機の上昇能力を考慮し、撮影基準面を平地に合わせ山岳地もそのまま撮影することとした。その結果、山岳部の図化において途中モデル縮尺（機械縮尺）を変更せざるをえない。

撮影コースはインド国境を考慮し、やや斜めコースとした。

##### (B) 基準点測量（標定点）（図9-2）

既設三角点は山地部に一等及び二等三角点が整備されており、精度的にも信頼できるので、山地部の標定点はこれらの既設三角点を利用する。

ルンビニ県の50%を占める平地部には既設基準点が少なく、新たに基準点（標定点）を設ける必要がある。基準点の測量方式はGPSによる相対測位（干渉測位）を主体に実施する。

山岳部は急峻な山が多いので、登山には十分な装備が必要であり、あるいはヘリコプターの使用が効率的である。

##### (C) 水準点測量（図9-3）

ルンビニ県には、一等水準路線及び二等水準路線があるが、空中三角測量、縮尺1/25,000図化（等高線）のためには簡易水準路線の設置が必要である。

(D) 空中三角測量

空中三角測量は、ブロック調整法（独立モデル法、ハンドル法）を原則とするが、もしインド国境付近の撮影ができない場合は、その部分については単コース調整法による実施も可能である。

(E) 図化（図9-4）

図化縮尺は1/25,000、等高線間隔は10mとし、平地部においては5mの間曲線を入れる。

図郭は12.5km×12.5kmで表すが、投影方法はUTMである。また、図式については、原則としてネパール測量局規定の図式を使用する。

(F) 現地調査

山岳部における現地調査は困難を伴うため、事前に予察作業を十分に行い、不明瞭な点は現地部落においての聞き取り調査を重点に行う必要がある。なお、地名、行政界はネパール側が提供するものとする。

9-1-2 全体計画

(A) 測量地域

北緯27°30′、東経83°付近の地域で、面積は約9,000km<sup>2</sup>

(B) 撮影面積

広角カメラによる、1/50,000空中写真撮影約9,000km<sup>2</sup>

(C) 地上測量

標定点測量（GPS）、簡易水準測量及び刺針、現地調査及び補備測量

(D) 地形図

縮尺1/25,000、等高線間隔10m（間曲5m）

図郭12.5km×12.5km

5色刷り地形図 81面

9-1-3 年次計画

本計画は、1990年から1993年の3ヵ年にわたり下記の年次計画となる。

(A) 第1年次

空中写真撮影	.....	9,000km <sup>2</sup>
基準点測量（標定点）	既設三角点刺針	18点
	新設三角点	17点
水準測量	既設水準点刺針	280点
	簡易水準	200 km

(B) 第2年次	
現地調査	.....9,000km <sup>2</sup>
空中三角測量	.....291モデル
図化	.....81面
(C) 第3年次	
製図	.....81面
補備測量	
印刷	.....81面×1,000部

## 9-2 実施計画

### 9-2-1 空中写真撮影

広角カメラを使用して、約1/50,000空中写真を全対象地域（ルンビニ県）について撮影する。

撮影基準面は、平地部（海面）とする。

### 9-2-2 基準点測量（標定点）

GPS測量を主体に実施する。測量方法は相対測位（干渉法）とし、できるだけ一等三角点を与点とする。

### 9-2-3 水準測量

簡易水準測量で行う。

### 9-2-4 刺針

基準点（標定点）測量、水準測量の刺針作業を行う。既設点の刺針は、写真に明瞭に写る地物、地形に偏心が必要である。

### 9-2-5 現地調査

撮影された空中写真をもとに、判読困難な箇所の調査、注記（地名、建物名、河川名等）及び関係資料を現地で入手する。

### 9-2-6 空中三角測量

解析図化機、ステレオコンパレータなどを使って観測、そしてコンピュータによる調整計算を行う。

### 9-2-7 図 化

図化機を用いて、等高線間隔10mで縮尺1/25,000の図化を行う。図郭は、12.5km×12.5km、投影法はUTMとする。

インド国境付近で旧写真を使う場合において、接合部分で大きな差違が生じた場合は、双方の協議により対処する。

### 9-2-8 補備測量

地名、行政名確認が主となるが、必要に応じて現地での補備測量を行う。

### 9-2-9 製 図

スクライブ法により色別分版を行い、最終的には校正刷りでネパール側の点検、承認を必要とする。

### 9-2-10 印 刷

オフセット方式により、5色刷り各1,000部とする。

## 9-3 実施上の問題

### 9-3-1 空中写真撮影

今回の撮影区域の南側はインドと国境を接しており、インドの撮影許可が必要となる。もし不許可の場合は旧写真を使わざるをえないが、経年変化はあるものと思われる。

撮影適期が短いため、再撮影を避ける手段を講じなければならない。例えば、カメラトラブル、写真処理トラブル等は絶対に避けなければならない。そのためには、予備カメラ、写真処理器材を日本から現地に持ち込み、万全を期す必要がある。さらに、撮影、写真処理に日本側技術者が常時待機し、指導・監督を行い、また、気象状況を把握して撮影の可否を判断する必要がある。

### 9-3-2 基準点

既設点の大半は山地にあり、確認にかなりの労力を費やす。場合によっては、ヘリコプターを使用することも考慮しなければならない。

また、水準点においても地下埋石がほとんどであるため、発掘、確認にかなりの日数が必要である。

簡易水準測量は、空中三角測量のためだけでなく、等高線の精度確保のためにも使用することを含めた計画が必要である。

### 9-3-3 図 化

平地における等高線の図化は、地形をつかみ難いので簡易水準測量の成果を利用して、精度の

確保を得る必要がある。

山岳地における図化は、縮尺の関係からモデル縮尺を途中で変更しなければならない場合が出てくる。

写真判読は概ね容易であるが、山岳地においては、山奥に点在する家屋の描画洩れに注意しなければならない。

#### 9-3-4 本部及びサブキャンプ

本部は作業上、中心地であるパイラワまたはプトワルになろう。この地からカトマンドゥまでは、電話もよく通じるが、各キャンプ間の通信は無線機の使用となる。

班編成は、最低5班（山岳地2班、平地2班、本部及びサポート1班）が必要であり、連絡を密にとりながらの作業になる。

#### 9-3-5 交通手段

車を使った移動、調査になるが、山岳地においては徒歩による調査も必要となり、危険防止には十分な注意が必要である。また山岳地の標定点測量（刺針）にはヘリコプターの使用もあり得る。

#### 9-3-6 動物

山岳地及びジャングルには毒蛇がいるため、現地案内人を雇い、十分な情報を得ての作業計画をつくる必要がある。

#### 9-3-7 衛生

生水、生野菜などには十分注意する必要がある。肝炎、日本脳炎、狂犬病、コレラなどの予防注射は行うべきであろう。

また現地作業においても、過労にならないような計画にすべきである。



ルンビニ基準点計画図

- △ 既設基準点 (刺針)
- 新設基準点

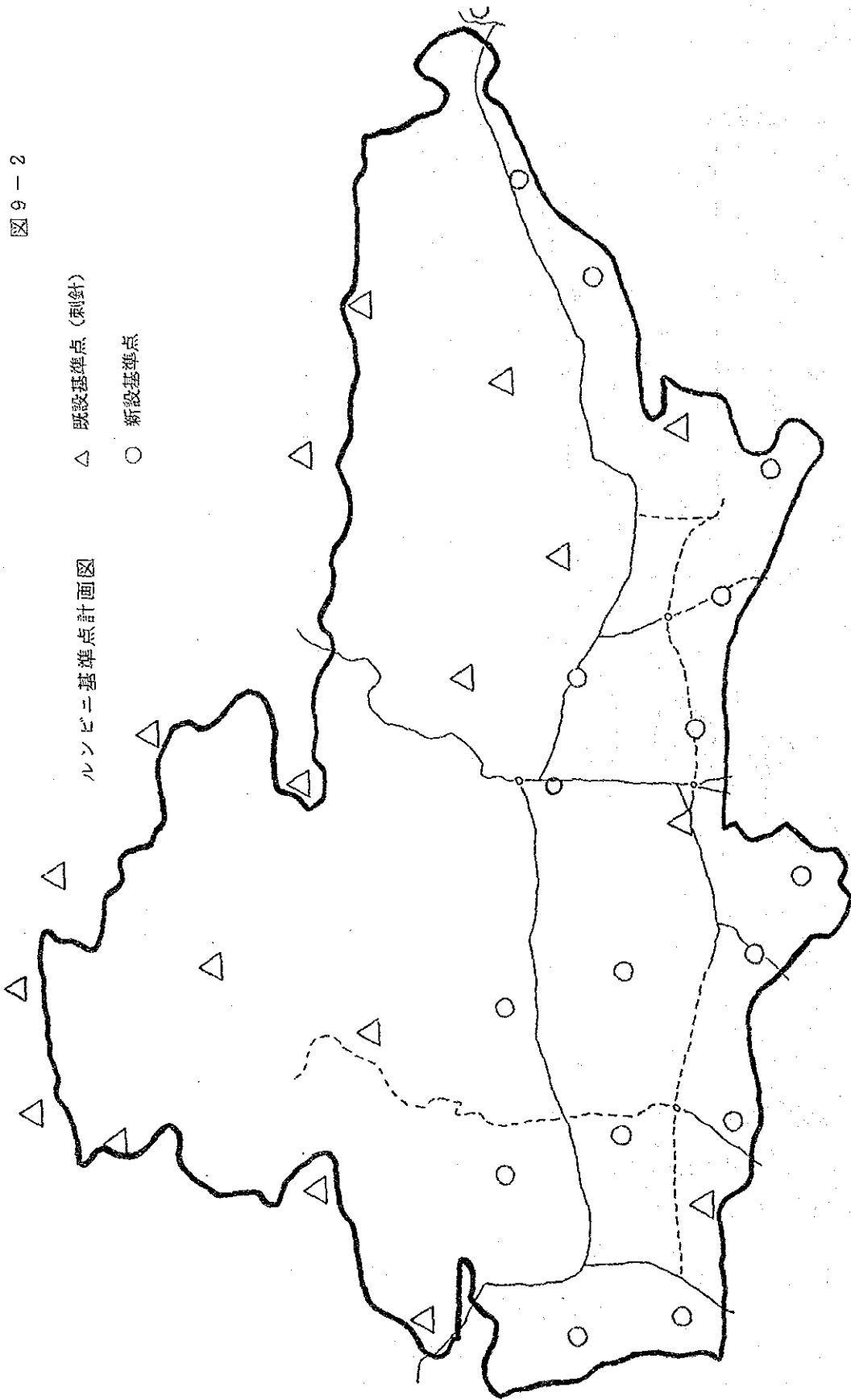
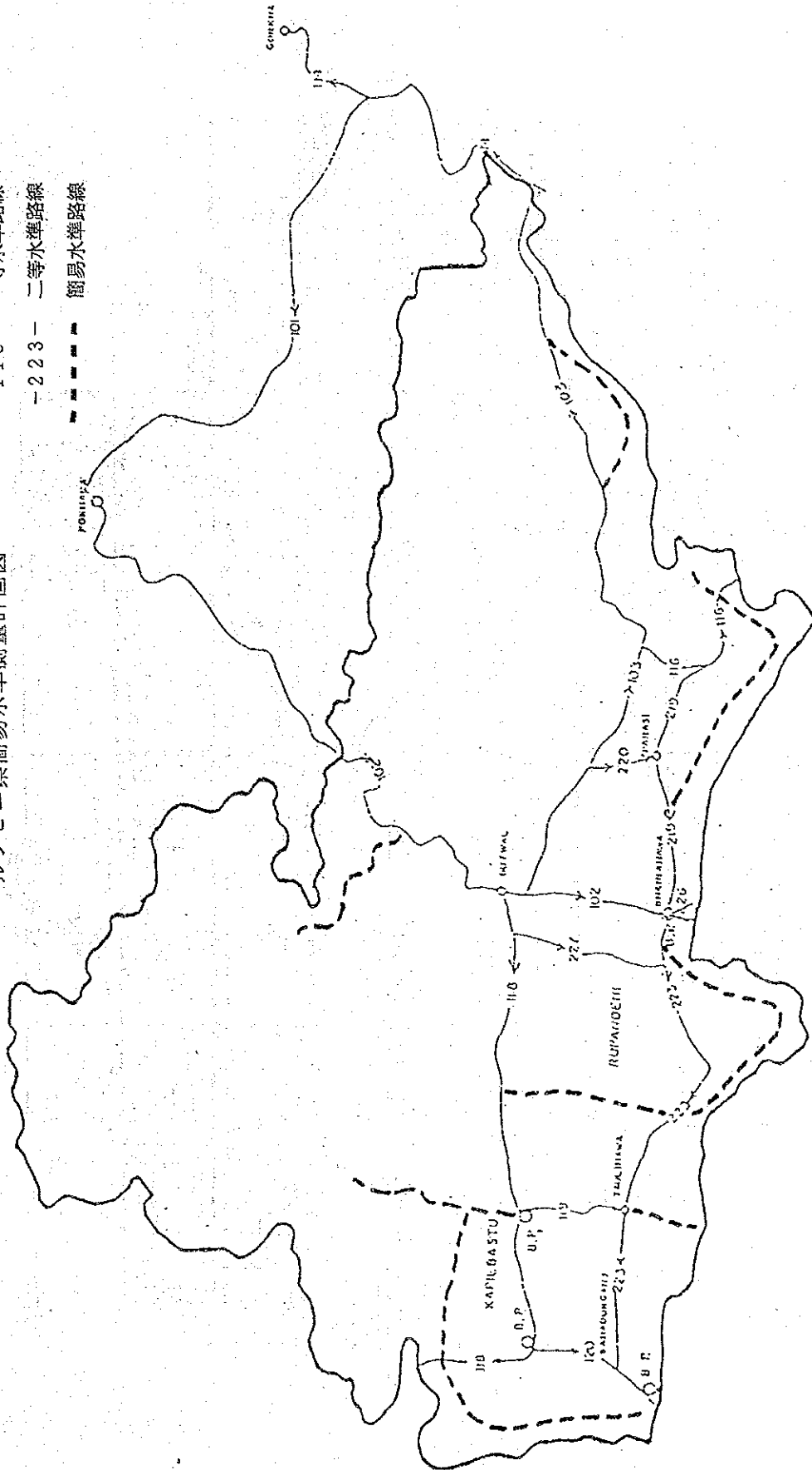


図 9-3

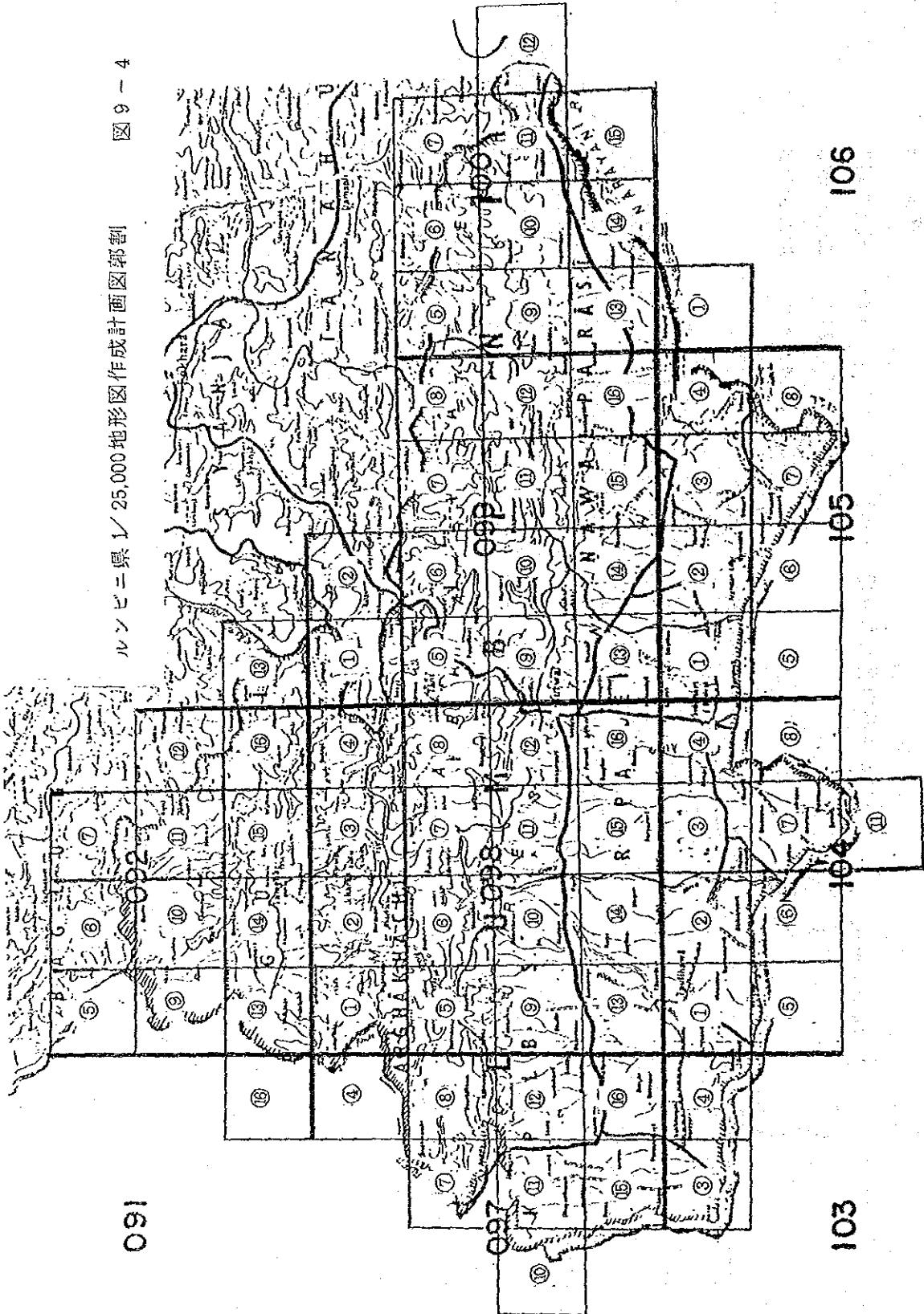
ルンビニ県簡易水準測量計画図

- 118- 一等水準路線
- 223- 二等水準路線
- 簡易水準路線





ルンビニ県 1/25,000地形図作成計画図郡割 図9-4



## 10. 収 集 資 料

1) 1/25,000地形図図式

2) 収集資料リスト

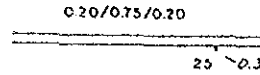


Roads

1:25'000

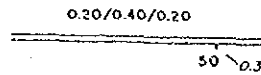
1st class road (highway) minimum width 7m; metalled; allows the crossing of two cars without any making way by one car; milestone (km-stone)

yellow filling (tufftone)



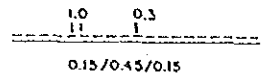
2nd class or link road useful width 4-7m; usually metalled or otherwise weather independent; important connecting roads with at least 3m width; mile- or km- stone

yellow filling (tufftone)

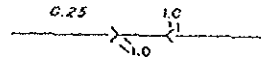


3rd class road useful width 2-4m allowing the passage of a 3.5 tons heavy truck

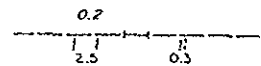
white filling, pecklines always on the northern or western side



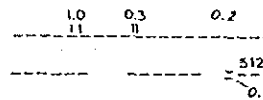
4th class road, fairweather jeeptracks of at least 1.5m useful width; in Terai also bullock-tracks; no limit in largeness upwards; allowing the passage of a 1ton vehicle; suspension bridge motorable



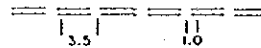
5th class road; all routes of interregional importance; width at least 1m up to a height of 2m, to allow the passage of a heavy loaded porter; some parts maybe jeepable but may contain steps and footbridges as well.



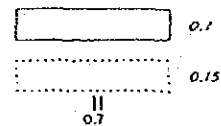
6th class footpath, traces, mountain passage, trekking route  
blue on glaciers



Road under construction  
width and thickness according to final importance



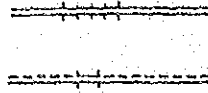
Airfield, hard surface runway  
grass strip  
white filling



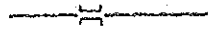
Roads

1:25'000

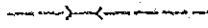
Bridges with pillars



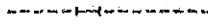
Vehicle bridge (4th cl. road)



Suspension bridge (5th cl. r.)



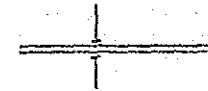
Footbridge (all other types)



Level crossing



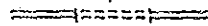
Underpass



Overpass



Tunnel or gallery



Parklane



Railways

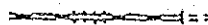
Normal gauge, single track



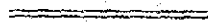
Normal gauge, double track with halt



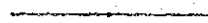
Bridge and tunnel (two lines if two tubes)



Narrow gauge (sticks show the number of tracks)



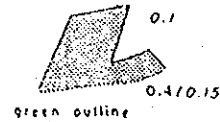
Aerial cable lift with station and pylon or ropeway, goods lift



## Vegetation

Forest closed edge; open edge,  
timber-line in the mountains  
Green filling

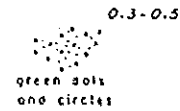
1:25'000



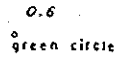
Open woods (trees so far from  
each other, that no closed  
area appears)



Scrubs mixed with smaller trees  
e.g. rhododendron



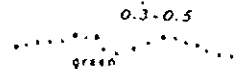
Single tree or group of trees;  
remarkable trees in villages,  
only along allees or in parks.



Surveyed trees (if taken over  
from old maps otherwise normal  
single tree with spot height)



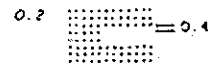
Hedge: wind-protection,  
border-feature



Orchard: border scale right,  
number free; form regular or  
irregular; only outside  
villages green dots



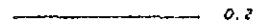
Nursery: e.g. tree, important  
orientation feature in the  
forest; small fruit-trees;  
cultivation; areas bigger than  
1sq.mm in the map green dots



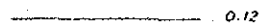
## Terrain

### Index contourlines

earth brown



scree, shingle, rock black



water, ice blue

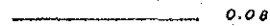


### Intermediate contourlines

earth brown



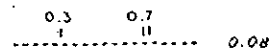
scree, shingle, rock black



water, ice blue



### Supplementary contourlines



## Terrain

Small depression (add more sticks with increasing scale)  
same colour as contourlines

Escarpment earthen or rocky;  
min. height 5m and 50m in  
length and/or remarkable  
orientation feature

Cliffs

Embankment; cutting brown  
min. height = contour-interval

Avalanche barricade

Earth slip brown

Quarry

Gravel pit, clay pit brown

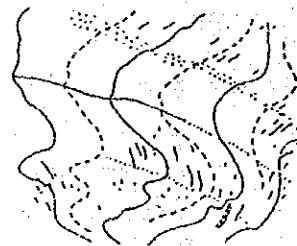
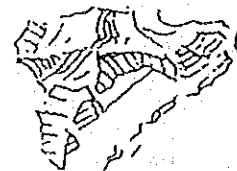
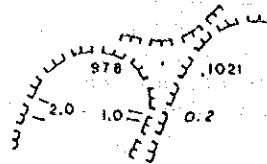
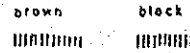
Rock, scree  
e.g. with 100m-contourlines

## Hydrography

Glacier; moraine; contourlines  
blue even if the glacier is  
completely covered by moraines

Storage lake; dam with road;  
overflow level; earthen dams  
with brown contourlines

1:25'000

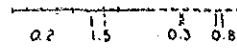


# Hydrography

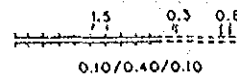
1:25'000

Pressure pipeline with underground aqueduct

water p. in blue, oil p. in black



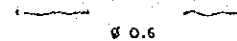
Multiple pipeline



Torrent weirs; rapids blue  
gravel correction-dikes brown or black



Spring; ooze away place blue



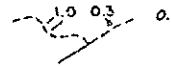
Annotation for special spring e.g. thermal spring blue

0.1 0.6

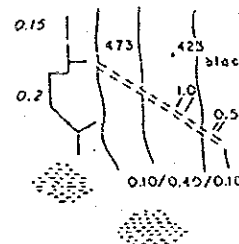
Stream (water throughout the year); waterfall, minimal height = contour-interval



Dry gully (non-perennial water but helpful as relief-feature) blue



Lake blue screen  
lake level; natural shoreline; non-perennial shoreline in blue  
spot height at lake bottom; boat harbour; ship station; car ferry



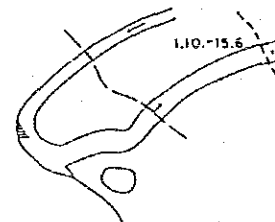
Swamp blue



Non-perennial lake with highest water mark blue

River; back water, no longer any contact with the old bed; bank protection striking walls or other constructions; passenger ferry (dated, with- or without rope); weir, higher than 3m; ford

Map revision: only needed if there is a principle change in the river-bed



Small, natural pond blue lines and filling





## Hydrography

1:25'000

Reservoir, watertank, swimming-pool (only those visible at the surface); water tower

both symbols are black with blue dot inside

10/0.15/0.3

10/0.15/0.3

Well, fountain (only those with public importance)

0.8/0.15

Water tap, stone pipeline

1.5/0.5/0.2

Water treatment plant  
black lines and blue filling

in scale:

0.1 : 100

## Boundaries

National boundary; marks with number

+++++ 15 0.7/0.1  
0.25 1.0 0.4

Zonal boundary

+++++ 1.0 0.5 1.0

District boundary

+++++ 0.25 1.0 0.5

Panchayat boundary

----- 0.2 1.0 1.0

Ward boundary

----- 0.2 1.0 0.5

National parks  
yellow ribbon, 50' or 100' or 200'

----- 1.5

## Individual symbols

Buildings used or not with walls and roof should be mapped (generalisation according to scale)

▲ 0.25

Public houses e.g. police, post office, tallgate

■ 0.5/0.1

School; mill

○ 1.0 1.0  
□ 2.0/0.1

Health post; hospital

⊕ 0.2/0.1 ⊕ 0.1

## Individual symbols

Open shed, greenhouse

Sports ground

Temple: Hindu

Buddhist

Moslem (mosque)

Christian (church)

Cemetery or other cremation places

Ruins (historical objects only if still something can be seen);

Wall, chautara; dry walls especially in open areas

Cave (entrance only); erratic block

Monument; camp site

Chimney-stack

Tower e.g. lookout tower

High tension transmission line

Overland telephone or telegraph lines (important for orientation)

Transmission tower or house

Radiotransmitter; outdoor substation e.g. transformer, switch station


Triangulation point (1.-3.order)


4th order point or levelling point (bench mark) in dm


Spot height: photogrammetrical point  
brown dot and number


normal point  
(dot or cross according to situation)


1:25'000


 0.3  
0.12 min. 1.2


 = 0.4 / 0.15


 0.6 / 0.9 / 0.8 / 0.1


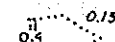
 0.6 / 0.9 / 0.8 / 0.1


 0.6 / 0.9 / 0.4 / 0.1

 0.6 / 0.9 / 0.8 / 0.1

 0.12  
0.8



 0.15



 0.2  0.15  
0.4




 0.5 / 0.15

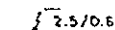
 1.3 / 1.3  0.15  
1.5 / 1.5


 0.8 / 0.1  0.8


 min. 0.8  0.1

 0.5  1.0  
0.1 5.0

 5.0  0.3  0.1

 2.5 / 0.6  2.5 / 0.6

 1.5 / 0.1  
0.4

 1.0 / 0.1  
2040.2

 1532.8  
0.8 / 0.1

 6851  
0.3

 1075  
0.3

 7610  
0.8 / 0.1

収 集 資 料 リ ス ト

SD (SURVEY DEPARTMENT)

資 料 名	部数等	入手機関	備 考
1. 1/50,000地形図	6地区	SD	1/63,360から1/50,000拡大図
2. 1/50,000地形図	6地区	"	カラー印刷 (5色刷)
3. 1/2,000,000 標高分布図	2部	"	カラー印刷 (5色刷)
4. 1/1,500,000 標高分布図	1部	"	布カラー印刷 (8色刷)
5. KATHMANDU VALLEY	3部	書 店	縮尺約1/76,000 (2色刷)
6. 一等三角点網図	1部	SD	1/3,000,000
7. ネパール・ルートマップ	1部	書 店	1/500,000
8. 1/500,000 ネパール全国図	3地域	SD	3枚で全土カバー (5色刷)
9. 1/250,000 ルンビニ県全図	2部	"	ネパール語 (5色刷)
10. 1/2,500 都市図	1部	"	等高線0.5m間隔 藍焼図
11. LAND SYSTEMS MAP	1部	"	1/50,000 単色刷
12. LAND CAPABILITY MAP	1部	"	1/50,000 単色刷
13. GEOLOGICAL MAP	1部	"	1/125,000 単色刷
14. LAND UTILIZATION MAP	1部	"	1/50,000 単色刷
15. バイラワ・ブトワル	1部	"	1/125,000 3色刷
16. 1/50,000 シート割図	1部	"	1/2,000,000 単色刷
17. ランドサット写真図	2地域	"	1/500,000 2枚で全国カバー
18. 車輛カタログ	2冊		ランド・クルーザ、ショウト・ホイルベース
19. SD業務案内	1部	SD	
20. 1/25,000地図作成作業仕様書	1部	"	
21. 図式規程	1冊	"	
22. TRIANGULATION INSTRUCTION BOOK	1冊	"	
23. LEVELLING INSTRUCTION BOOK	1冊	"	
24. ASTRONOMY INSTRUCTION BOOK	1冊	"	

## 11. 附 属 資 料

- 1) 質問書
- 2) ネパール国ルンビニ県地形図作成調査（S/W協議）対処方針案
- 3) 測量局で販売している地図
- 4) S/W及びM/M



1) 質問書

QUESTIONNAIRE (DRAFT)

TOPOGRAPHIC MAPPING OF LUMBINI ZONE  
IN HIS MAJESTY'S GOVERNMENT OF NEPAL

PRELIMINARY SURVEY TEAM

OF

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

I. NATIONAL STATUS

I T E M	DESCRIPTION	AVAILABILITY	NOTE : (RESPONSE)
1. CENTRAL GOVERNMENT ORGANIZATION	(1) ORGANIZATION CHART (2) POSITION OF THE SD	Yes Yes	
2. ORGANIZATION IN CHARGE OF AND/OR CONCERNED WITH THE SURVEY	(1) ORGANIZATION CHART (a) HEAD OFFICE (b) LOCAL OFFICES (c) ANNUAL REPORT (d) NUMBER OF EMPLOYEES		
3. LATEST ECONOMIC INDICES (NATIONAL/LOCAL)	(1) GNP AND GDP (2) POPULATION (3) GROWTH RATE OF POPULATION (4) OTHERS		
4. ECONOMIC DEVELOPMENT PLAN (NATIONAL/LOCAL)		National	
5. ONGOING DEVELOPMENT SURVEY/PROJECT IN THE PROPOSED SURVEY AREA		No	

II. CONFIRMATION OF THE REQUEST

I T E M	DESCRIPTION	AVAILABILITY	NOTE : (RESPONSE)
1. OBJECTIVES OF THE REQUESTED MAPPING PROJECT	(1) RELATIONS WITH NATIONAL/LOCAL DEVELOPMENT PLAN		National/Local
2. ONGOING MAPPING PROJECTS	(1) DESCRIBE THE DETAIL OF THE PROJECTS	No	No
3. ANY OTHER COOPERATION BY THE THIRD COUNTRY. IN THE FIELD OF MAPPING	(1) COUNTRY (2) PERIOD OF THE COOPERATION (3) CONTENTS OF THE COOPERATION		
4. CONTENTS OF THE REQUESTING SURVEY A) TOPOGRAPHIC MAP	(1) AREA OF AERIAL PHOTOGRAPHY (ATATCH THE LOCATION MAP) (2) SCALE OF AERIAL PHOTOGRAPH (3) AREA OF TOPOGRAPHIC MAPPING (ATATCH THE LOCATION MAP) (4) SCALE OF TOPOGRAPHIC MAP (5) CONTOUR INTERVAL (6) PROJECTION (7) ELLIPSOID ELEMENTS (8) SHEET DIMENSION (9) NUMBER OF COLORS (10) OTHER REQUEST		(9,000)km <sup>2</sup> 1/(25,000) (9,000)km <sup>2</sup> 1/(25,000) (5~10)m Modified UTM Everest1830 (12)°, (5)km× (12)°, (5)km ( )



III. BASIC INFORMATION FOR THE SURVEY

I T E M	DESCRIPTION	AVAILABILITY	NOTE : (RESPONSE)
1. AERIAL PHOTOGRAPHY	<p>(1) EXISTING AERIAL PHOTOGRAPHS IN THE PROPOSED AREA</p> <p>(2) AVAILABILITY OF AIRPLANE</p> <p>(3) AVAILABILITY OF AERIAL CAMERA</p> <p>(4) ANY ORGANIZATION FOR AERIAL PHOTOGRAPHY</p> <p>(5) AVAILABILITY OF AIRPORT BASE</p> <p>(6) AVAILABILITY OF FACILITIES FOR AERIAL PHOTOGRAPH PROCESSING</p> <p>(7) PERMISSION OF TAKING THE AERIAL PHOTOGRAPHS</p> <p>(8) TAKING FILMS OUT OF NEPAL FOR THE IMPLEMENTATION OF THE SURVEY</p> <p>(9) APPROPRIATE MONTHS OF THE YEAR FOR AERIAL PHOTOGRAPHY</p>	<p>Yes</p> <p>1:50,000</p> <p>Yes</p> <p>Yes</p> <p>SD</p> <p>Yes</p> <p>Yes</p> <p>Yes</p> <p>No</p> <p>Nov. ~Mny</p>	<p>TO BE PREPARED</p> <p>VERY URGENTLY</p>
MAPS	<p>(1) EXISTING TOPOGRAPHIC &amp; THEMATIC MAPS</p>	<p>Yes</p> <p>1:50,000</p>	<p>TO BE PREPARED</p> <p>VERY URGENTLY</p>
CONTROL POINT SURVEY	<p>(1) INDEX MAPS AND CONTROL DATA LISTS OF CONTROL POINTS (HORIZONTAL/VERTICAL)</p> <p>(2) DATUM (HORIZONTAL/VERTICAL)</p> <p>(3) CONFIRMATION OF EXISTENCE OF THE POINTS</p>	<p>Yes</p> <p>Yes</p> <p>Yes</p> <p>No</p>	
AERIAL TRIANGULATION	<p>(1) METHOD OF AERIAL TRIANGULATION</p>	<p>IM Bleck</p> <p>adjustment</p> <p>Yes</p>	
SPECIFICATION OF MAPPING			

IV. OTHER INFORMATION FOR THE SURVEY

I T E M	DESCRIPTION	AVAILABILITY	NOTE : (RESPONSE)
1. LAWS & REGULATIONS OF MAPPING		Yes	
2. METEOROLOGICAL DATA IN THE PROJECT AREA	(1) RAIN FALL BY MONTH (2) TEMPERATURE BY MONTH (3) CLOUD AMOUNT BY MONTH		
3. LIST OF SURVEY EQUIPMENT	(1) EDM (2) THEODOLITE (3) LEVEL (4) COMPARATOR (5) PLOTTER (6) COMPUTER (7) OTHERS	Yes Yes Yes No Yes No	
4. AVAILABILITY OF TRANSPORT (EITHER YOUR GOVERNMENT VEHICLES OR RENTAL CARS)	(1) 4WD CARS (2) TRUCKS (3) OTHERS	No No	
5. APPROVAL OF USE OF RADIO CALL EQUIPMENT		Yes	
6. AVAILABILITY OF COUNTERPARTS		Yes	
7. AVAILABILITY OF LABOURERS	(1) DRIVERS (2) WORKERS (ALSO LET US KNOW WAGEK/DAY)	Yes Yes	
8. ANY SPECIFIC RESTRICTIONS RELATED TO THE PROJECT			

2) ネパール国ルンビニ県地形図作成調査事前調査 (S/W協議)  
対処方針案 (1)

項 目	対 処 方 針	備 考
<p>1. 事前調査の目的及び行動予定</p>	<p>事前調査団派遣までの経緯を説明の上、次の通り目的を整理し、説明する。            ①TORの具体的内容及び意向の確認            ②Q/Nに基づく資料及び情報の収集            ③JICA事業の説明            ④現地踏査            ⑤本格調査の基本計画及びS/Wの協議            ⑥先方受入れ体制の確認            ・先方政府の実施すべき事項            ・先方カウンタパート機関            ・その他            ⑦調査期間の協議            ⑧S/W、M/M議事録締結            ⑨本格調査実施に必要な情報収集</p>	<p>基準点調査、現地状況調査等。</p>
<p>2. 協議機関</p>	<p>ネパール測量局 (SURVEY DEPARTMENT) その他現地にて対応する。</p>	<p>要請機関。</p>
<p>3. 具体的作業内容 (1)要請内容及び意向の確認 ・全般 ・協力範囲 ・経緯 (2)Q/Nに基づく情報・資料収集及び協議 (3)本格調査の実施方針及びS/Wの内容協議 (4)M/M、S/Wの締結 (5)本格調査に必要な事項</p>	<p>我が方の本件調査協力に関する基本的考え方を説明する。合意事項については、S/W、M/Mに盛り込む。            ①ルンビニ県約9,000km<sup>2</sup>を対象とする地形図を作成する。            本件調査の要請に至るまでの経緯を確認する。            別途作成するQ/Nに基づき情報収集及び協議を行う。            協議結果をM/MまたはS/Wで確認する。            署名者は先方機関を代表する権限を有する者とする。            ①調査の実施規模、必要期間、ローカルコンサルタントの能力            ②本格調査の実施時期            ③再委託可能業務の作業量及び見積り等            ④作業室、コンサイニーの確認</p>	<p>撮影。</p>

<p>4. 請訓事項</p>	<p>⑤全体作業量の把握、及び実施方法の検討</p> <p>①UNDERTAKINGにかかる事項については、必要に応じて請訓する。</p> <p>②調査内容の大幅な変更</p> <p>③その他重大な事項</p>	<p>調査地域、要請と異なる調査内容等。</p>
<p>5. 事前調査団員の各担当事項</p> <p>(1) 総括</p> <p>(2) 協力政策</p> <p>(3) 測量計画</p> <p>(4) 測量積算</p> <p>(5) 調査企画</p> <p>(6) 写真測量 (役務提供契約団員)</p> <p>(7) 基準点測量 (役務提供契約団員)</p>	<p>①調査団の業務全般の総括</p> <p>②調査団を代表してS/W、M/Mの署名を行う。</p> <p>③事前調査報告書の基本的方針の作成及びとりまとめ</p> <p>①我が国の地形図作成の基本的な考え方の説明</p> <p>②協力要請の背景調査</p> <p>③本件調査の位置付けの調査</p> <p>①各分野にかかわるすべての調査、協議、結果のとりまとめを総括の指示に基づき行う。</p> <p>①JICA 開発調査システムの説明</p> <p>②関連資料・情報の収集、整理及び分析のとりまとめ</p> <p>③調査実施にあたっての全体計画の作成及びその総合的な調整</p> <p>④業務調整</p> <p>①調査団の指示に基づき、資料収集・整理、報告書案のとりまとめを行う。</p> <p>②その他</p>	<p>第三国協力案件調査を含む。</p>
<p>6. S/W、M/Mへの記載事項</p>	<p>①S/W協議時の合意、変更、または要請事項重要な事項</p>	<p>国境沿いの撮影範囲、同図化範囲、調査車輛、無線機の周波数、撮影期間の目途 TECHNICAL SPECIFICATION、等高線間隔、印刷図の色数等。</p>
<p>7. 報告書</p>	<p>別途作成した目次案に従って、各担当者により作成する。</p>	

ネパール国ルンビニ県地形図作成調査事前調査 (S/W協議)  
 対処方針案 (2)

項 目	対 処 方 針	備 考
1. 図化範囲の拡大	当初要請は2県であったが、予算上の理由で1県に絞った経緯があり、ルンビニ県のみとする。撮影範囲についても同様とする。	先方が引き下がらない場合は請訓する。
2. 実施調査期間の短縮	先方が強く要請してきた場合、基本計画を検討し、実施可能であれば、受け入れることとする。	現段階では、暫定計画であることを理解せしめておく。
3. 国境沿いの撮影及び図化	期限を設け、ネパール側にインドの了解を取り付けるよう要求する。取り付けられない場合には、資料のみによる図化または、国境付近の撮影、図化は行わない(チュニジアの例を参考にする)。	M/M/に記載する。
4. 撮影機関	UNDP 機を撮影に使用することは、必要時、必要期間の使用が確約されないこともあり、不安がある。したがって、他の撮影機関(第三国を含む)の可能性をあたる(撮影の適期に撮影が極めて容易とのことであればUNDP 機でも可能である)。	以下、必要に応じ、M/M/に記載する。
5. 対空標識の設置	ネパール側に依頼する。困難であれば、我が方が行うものとする(刺針と併せ検討する)。	
6. 作業規程	ネパール側にある場合は、検討し、対応可能であれば、その規程に基づき地形図作成を行う。ネパール側には、我が方の規程を提案する。	
7. 等高線間隔	10mとする。事前調査開始前に5mの可能性、問題点につき整理しておき、事前に対処方針を決定する。	
8. 印刷図の色数	5色とする。先方が6色を強く要望する場合のみ受け入れることとする。	
9. JICA 保有の地形図(各2部)の保有	不可能ならばやむをえないものとする。	
10 調査用車輛	先方が、必要期間、必要台数、確実に提供可能でなければ、借り上げ、現地購入、本邦購送の観点から、具体的な調査を行う。	
11. 無線機の使用	ルンビニ県とカトマンドゥ間の連絡が可能となるよう配慮する。無線機の場合は周波数の割当てが必要である。	周波数は本格調査開始前に必要。
12. C/Pの日本研修	過去の例を説明し、先方の要望をよく調査する。	

3) 測量局で販売している地図

S.No	Map Title	Version	Scale	No. of sheets	Price	Remarks
1	Nepal	English	1:2,000,000	3	1.75	Administrative/ Physiographic/ Relief
2	Nepal	Nepali	1:2,000,000	2	1.75	Administrative/ Relief
3	Nepal	English	1:1,500,000	1	25.00	Screen Print
4	Nepal	English	1:1,000,000	2	12.00	Climate/ Administrative
5	Nepal	English	1:1,000,000	2	10.00	Mineral/ Geology
6	Nepal (wall map)	English	1:1,000,000	1	36.00	Political
7	Regional	English	1:3,00,000	5	5.00	Administrative
8	Regional	Nepali	1:3,00,000	5	3.50	Administrative
9	Nepal	English	1:5,00,000	3	7.00	Administrative
10	Zonal	Nepali	1:2,50,000	12	3.50	Administrative
11	Climatological	English	1:2,50,000	7	10.00	Far and Mid Western Development Region
12	District Map	Nepali	1:1,25,000	74	6.00	Administrative
13	Thematic	English	1:1,25,000	92	10.00	Geological
14	Thematic Map (Resources)	English	1:50,000	255 x 3	10.00	Land Utilization/ Land Systems/ Land Capability
15	Photo Map	English	1:50,000	7	30.00	
16	Topo Map	English	1:50,000	6	15.00	Topographical map
17	Topo Map	English	1:50,000	3	10.00	Topographical map
18	Kathmandu City Map	English	1:10,000	1	15.00	
19	Bahra bahu City Map	English	1:5,000	1	25.00	

4) S/W及びM/M

SCOPE OF WORK  
FOR  
TOPOGRAPHIC MAPPING OF LUMBINI ZONE  
IN  
NEPAL  
AGREED UPON BETWEEN  
SURVEY DEPARTMENT  
MINISTRY OF LAND REFORM AND MANAGEMENT  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY

FEBRUARY 28TH, 1990

KATHMANDU

*B. Shrestha*

---

MR. BUDDHI N. SHRESTHA  
DIRECTOR GENERAL  
SURVEY DEPARTMENT  
MINISTRY OF LAND REFORM  
AND MANAGEMENT  
HIS MAJESTY'S  
GOVERNMENT OF NEPAL(SD)

*N. Inoue*

---

MR. NOBORU INOUE  
LEADER  
THE PRELIMINARY STUDY TEAM  
JAPAN INTERNATIONAL  
COOPERATION AGENCY (JICA)

## I. INTRODUCTION

In response to the request of His Majesty's Government of Nepal ( hereinafter referred to as "HMG/N" ), the Government of Japan ( hereinafter referred to as "GOJ" ) has decided to implement the Topographic Mapping of Lumbini Zone in Nepal ( hereinafter referred to as "the Study" ), in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programmes of GOJ, will undertake the Study in close cooperation with the authorities of Nepal.

Survey Department of HMG/N (hereinafter referred to as "SD") shall act as the counterpart body to the Japanese Study Team (hereinafter referred to as "the Team") and also act as the coordinating body with other relevant organizations for the smooth implementation of the Study.

The present document sets forth the Scope of Work for the Study.

## I. OBJECTIVE OF THE STUDY

The objective of the study is:

- (1) To prepare 1/25,000 topographic maps covering the area of approximately 9,000km<sup>2</sup> (see Appendix I).

## II. SCOPE OF THE STUDY

In order to achieve the above mentioned objective, the Study will cover the following items (The technical specifications are as shown in Appendix N).

### 1. Aerial Photography

Aerial Photography shall be taken at the scale of approximately 1/50,000. Setting of air-photo signals shall be done if necessary, prior to commencement of the aerial photography.

### 2. Ground Control Point Survey

Existing ground control points shall be utilized, however, GPS, triangulation, traversing and leveling will be carried out, if necessary.

*Bns*

(19)



3. Pricking  
Pricking on the aerial photographs shall be done in the field, if necessary.

4. Field Identification  
The topographic and land use information shall be identified in the field by using the aerial photographs.  
Administrative boundaries and geographical names shall be collected.

5. Aerial Triangulation  
Aerial Triangulation shall be carried out by analytical block adjustment method.

6. Stereo Plotting and Compilation  
Stereo plotting shall be carried out using stereo plotting instrument at the scale of 1/25,000.

Compilation shall be done on the manuscripts.

7. Field Completion  
Topographic features, land use, vegetation, etc. which cannot be properly identified on the aerial photographs shall be identified in the field and plotted on the compilation sheets.  
Administrative boundaries and geographical names shall also be prepared and verified.

8. Drafting and Printing  
Based on the compiled sheets, scribing shall be carried out on the stable polyester base for five (5) color separation plates.  
Text shall be photo-typed.

Plate making shall be carried out using 1/25,000 combined negatives, and printing shall be carried out by offset method.

#### N. STUDY SCHEDULE

The whole work will be conducted in accordance with the tentative schedule as shown in Appendix I. In case the aerial photography is not completed within the expected period, both sides shall settle the further programmes of the Study.

The detailed work plan and the schedule of each Japanese fiscal year (from April to March) will be settled by both sides prior to the commencement of the works.

*Bans*

(14)

## V. REPORTS AND FINAL RESULTS

A report in English shall be presented to HMG/N by JICA every fiscal year except the final year, and the final report in English shall be presented upon the completion of the Study.

The final results mentioned in Appendix B will be submitted to HMG/N by JICA. These materials will belong to HMG/N after having completed the whole work.

All maps produced by the Study shall bear at the lower margin the following:

This map was produced under a cooperative undertaking between His Majesty's Government of Nepal and the Government of Japan.

## VI. UNDERTAKING OF HIS MAJESTY'S GOVERNMENT OF NEPAL

1. To facilitate smooth conduct of the Study, HMG/N shall make necessary arrangement;
  - 1) To secure the safety of the Team,
  - 2) To permit the members of the Team to enter, leave and sojourn in Nepal for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees,
  - 3) To exempt the members of the Team from tax, custom duties and other charges on equipment, machinery and other materials brought into Nepal for the implementation of the Study.
  - 4) To exempt the members of the Team from income tax and other charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Team for their services in connection with the implementation of the Study.
  - 5) To provide the necessary facilities to the Team for the remittances as well as utilization of funds introduced into Nepal from Japan in connection with the implementation of the Study.
  - 6) To secure permission for entry into private properties for the conduct of the Study.
  - 7) To secure permission for the Team to take all the necessary data and documents, including the diapositives and other aerial photographs, related to the Study out of Nepal to Japan.
  - 8) To provide medical services as needed. Its expenses will be chargeable on the members of the Team.

*Bns*

(12)

2. HMG/N shall bear claims, if any arises against the members of the Team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation for the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.
3. To facilitate smooth conduct of the Study, SD shall take necessary arrangements for the Team as follows, in cooperation with other relevant organizations;
  - 1) To secure permission for the aerial photography and use of airports for the implementation of the Study,
  - 2) To arrange helicopter and/or aircraft for the Team on their expenses,
  - 3) To secure permission for the use of communication facilities including transceivers,
  - 4) To employ labourers and drivers.
4. SD shall, at its own expense, provide the Team with following in cooperation with other related organizations;
  - 1) Available data and information related to the Study,
  - 2) 40-50 man power which includes the technicians, administrator and counterpart personnel,
  - 3) Suitable office space and facilities in Kathmandu.
  - 4) Aerial camera, levels, theodolites, laboratory facilities for aerial photography.
  - 5) Credential or identification cards to the members of the Team,
  - 6) Information of the necessary administrative boundaries and geographical names on the maps, at its full responsibility.

#### W. UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures, in accordance with the relevant laws and regulations in force in Japan;

1. To dispatch, at its own expense, the Study Team to Nepal, for the field work,
2. To pursue technology transfer for the Nepalese counterpart personnel in the course of the Study,
3. To provide the equipment and machinery for the conduct of the Study, which will remain the property of JICA unless otherwise agreed upon.

*Bms*

(12)

W. CONSULTATIONS

JICA and SD shall consult with each other in respect of any matter that may arise from or in connection with the Study.

Done

(12)

091

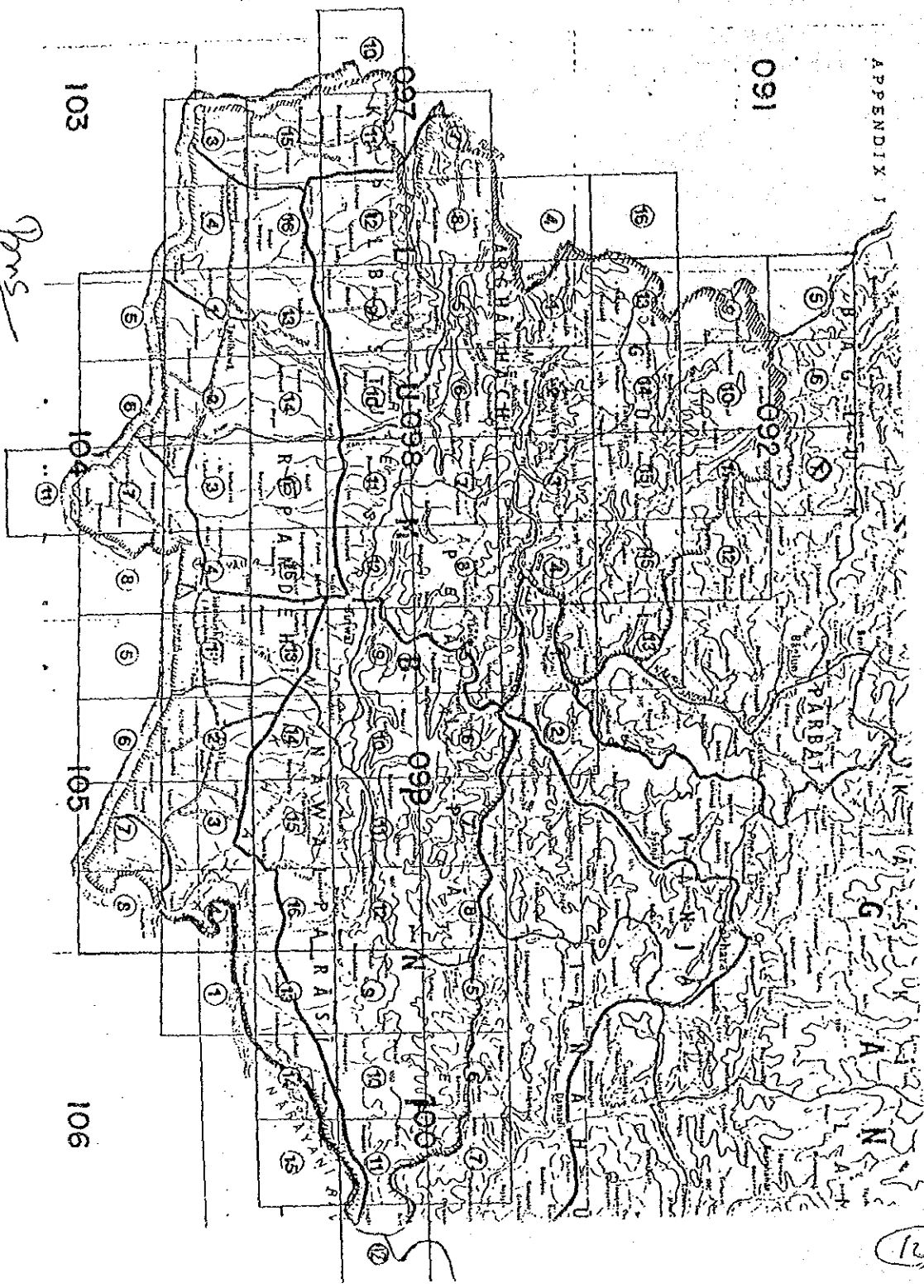
103

*pens*

104

105

106



(12)



Appendix E

Final Result

1. Aerial Photography

- (1) Original negatives (roll)
- (2) Diapositives
- (3) Contact paper prints
- (4) Index map

2. Topographic Mapping

- (1) Ground control point survey field books and results
- (2) Pricked and annotated photographs
- (3) Aerial triangulation results
- (4) Original manuscripts
- (5) Color separation combined sheets
- (6) 1/25,000 topographic maps in English (1,000 copies)

*Pms*

(12)

Appendix W

Technical Specifications

1. Topographic Mapping:

"A" class mapping specifications in the technical Manual of Overseas Surveying of JICA will be applied with the exception of some subjects and some areas, such as obscure areas on photographs, generalized building area, periphery of road in the suburbs and in rural area, and it will be resolved in consultation with each other.

2. Contour Lines:

10 meters contour intervals in hills and supplementary 5 meters intermediate contour line for flat area.

3. Format:

( 12.5km x 12.5km )

4. Number of Colors:

5 colors

5. Projection

Universal Transverse Mercator modified  
3' Zone, Central meridian 84'E Longitude.

*Pans*

(12)



MINUTES OF MEETING  
ON  
THE TOPOGRAPHIC MAPPING OF LUMBINI ZONE  
IN  
NEPAL  
BETWEEN  
SURVEY DEPARTMENT  
MINISTRY OF LAND REFORM AND MANAGEMENT  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY  
ON  
FEBRUARY 8, 1990  
KATHMANDU

*B. N. Shrestha*

---

MR. BUDDHI N. SHRESTHA  
DIRECTOR GENERAL  
SURVEY DEPARTMENT  
MINISTRY OF LAND REFORM  
AND MANAGEMENT  
HIS MAJESTY'S  
GOVERNMENT OF NEPAL(SD)

*Kazuo Inaba*

---

MR. KAZUO INABA  
DEPUTY LEADER  
PRELIMINARY STUDY TEAM  
JAPAN INTERNATIONAL  
COOPERATION AGENCY(JICA)

9. SD shall make an effort to prepare, for the Japanese study team, office space with necessary furniture in the field.
10. SD shall, at its own expense, provide the Japanese study team with reproduction facilities (e.g. photo-copy machine, blue print machine, etc.).
11. Magnetic deviation shall be drawn on the maps based on the data, if provided by SD.
12. SD shall make necessary booking for the mobilization of the UNDP's aircraft, if and when the Japanese side requested.

All the expenses, to be paid to UNDP, for mobilization of the aircraft for aerial photography will be borne by the Japanese study team.

13. Upon the completion of the whole work of the Study, JICA shall keep two (2) sets of the each sheet of the topographic maps, as a token of the friendly cooperation with SD.
14. In case the aerial photographs will be entrusted to the third country's company, the words of "the Japanese Study Team", used in the undertaking of His Majesty's Government of Nepal in the Scope of Work, shall be read as "the Japanese Study Team and the Team of aerial photography".
15. The Nepalese side strongly requested to the Japanese side the followings;
  - (1) To accept as many Nepalese counterpart personnel as possible to Japan for facilitating technical transfer in the course of the Study.
  - (2) To provide necessary materials for conducting the Study.
  - (3) To provide appropriate number of vehicles for smooth implementation of the Study.
  - (4) To take consideration to transfer of technology, by providing necessary equipments for conducting the Study.
  - (5) To draw hill shading, which is quite common for small and medium scale of maps in Nepal, for the hilly part of the study area for effective utilization of the maps.

The Japanese team replied that they will convey the above requests to the Japanese authorities concerned.

P. Shrestha

Kal

The preliminary study team on the topographic mapping of Lumbini zone, organized by JICA, visited Nepal from February 1, 1990 to February 10, 1990, to carry out the preliminary study for the captioned study.

During their stay in Nepal, the meetings were held between the Japanese study team and the Survey Department of Ministry of Land Reform and Management (SD) and the meetings resulted as follows.

1. The mutual understanding by both sides mentioned in this document will provide the basic idea to formulate the Scope of Work which will be signed in the beginning of March, 1990 by the leaders of the both sides.
2. The draft of the Scope of Work attached herewith is basically agreed by both sides, and will be finalized in the next meeting.
3. In consideration of budgetary constraint of Japanese side and the alternatives of the scale in Nepal are 1/25,000 or 1/50,000, the aerial photography shall be taken at the scale of approximately 1/50,000.
4. In respect with flight permission of the adjacent country for aerial photography over the national boundary, Nepalese side shall get the flight permission of the adjacent country, at latest two (2) months prior to commencement of the Study.

In case the flight permission by the adjacent country is not available, the area of approximately 10 km inside along the national boundary shall be basically excluded for the aerial photography, and the existing 1/50,000 aerial photographs shall be utilized for the topographic mapping.

5. The Nepalese counterpart of the team shall submit the quarterly report to SD in the course of the Study.
6. In the item of W.1.6) of the originally drafted Scope of Work, "and restricted areas" was deleted since there is no restricted area in the study area.
7. In the item of W. 1. 7) of the originally drafted Scope of Work, "the original negatives of aerial photographs" was amended to as "the diapositives and other aerial photographs".
8. The Nepalese side stated that the mutual understanding is to be recorded in the Minutes of Meeting, which will be expressed as "All the data, maps and aerial photographs shall not be published unless otherwise agreed upon by SD." The Japanese side will consider this matter and shall reply the result of consideration prior to signing of the Scope of Work.

*Bns*

*K.D*

LIST OF PARTICIPANTS

NEPALESE SIDE

(SURVEY DEPARTMENT)

1. MR. BUDDHI N. SHRESTHA	DIRECTOR GENERAL
2. MR. PUNYA PRASAD OLI	ACT. DEPUTY DIRECTOR GENERAL
3. Mr. R.P. MARATHA	CHIEF SURVEY OFFICER
4. Mr. BIJAYA LAL RAJBANSHI	SURVEY OFFICER
5. Mr. K.C. DUTTA	SURVEY OFFICER

JAPANESE SIDE

(JAPANESE STUDY TEAM)

1. MR. KAZUO INABA	DEPUTY LEADER
2. MR. MITSUO IWASE	MEMBER
3. MR. HIROSHI MURAKAMI	MEMBER
4. MR. SEIICHI KAKINUMA	MEMBER
5. MR. CHIYUKI NISHIMURA	MEMBER

(EMBASSY OF JAPAN)

1. MR. KENZO HIROKI	SECOND SECRETARY
---------------------	------------------

(JICA NEPAL OFFICE)

1. MR. MASAHITO OYAMA	ASST. RESIDENT REPRESENTATIVE
-----------------------	-------------------------------

*B. Shrestha*

*Kul*

MINUTES OF MEETING  
ON  
THE TOPOGRAPHIC MAPPING OF LUMBINI ZONE  
IN  
NEPAL  
BETWEEN  
SURVEY DEPARTMENT  
MINISTRY OF LAND REFORM AND MANAGEMENT  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY  
ON  
FEBRUARY 28, 1990  
KATHMANDU

*B. Shrestha*

---

MR. BUDDHI N. SHRESTHA  
DIRECTOR GENERAL  
SURVEY DEPARTMENT  
MINISTRY OF LAND REFORM  
AND MANAGEMENT  
HIS MAJESTY'S  
GOVERNMENT OF NEPAL(SD)

*N. Inoue*

---

MR. NOBORU INOUE  
LEADER  
PRELIMINARY STUDY TEAM  
JAPAN INTERNATIONAL  
COOPERATION AGENCY(JICA)

The preliminary study team on the topographic mapping of Lumbini zone, organized by JICA and headed by Mr. Noboru Inoue, visited Nepal from February 1, 1990 to March 5, 1990, to carry out the preliminary study for the captioned study.

During their stay in Nepal, the series of meetings were held between the Japanese study team and the Nepalese team, headed by Mr. Buddhi N. Shrestha and composed of officials from the Survey Department of Ministry of Land Reform and Management (SD), and the meetings resulted as follows.

1. The main objectives of the discussions are to set forth the Scope of Work and to exchange views to carry out the study in the most professional manner.
2. The final Scope of Work for the study dated February 28, 1990.
3. In respect with flight permission of the adjacent country for aerial photography over the national boundary, the Nepalese side shall get it at latest two (2) months prior to commencement of the Study.

In case the flight permission by the adjacent country is not available, the area of approximately 10 km inside along the national boundary shall be basically excluded for the aerial photography, and the existing 1/50,000 aerial photographs shall be utilized to complete the topographic mapping for the whole area of the Lumbini zone.

4. The Nepalese counterpart of the Japanese study team shall submit the quarterly report to SD in the course of the Study.
5. SD shall make an effort to prepare, for the Japanese study team, office space with necessary furniture in the field.
6. SD shall, at its own expense, provide the Japanese study team with reproduction facilities (e.g. photo-copy machine, blue print machine, etc.).
7. Magnetic deviation shall be drawn on the maps based on the data, if provided by SD.
8. SD shall make necessary booking for the mobilization of the UNDP's aircraft, if and when the Japanese side requested.

All the expenses to be paid to UNDP, for mobilization of the aircraft for the aerial photography, will be borne by the Japanese study team.

*Bns*

(u)

9. In case the aerial photographs will be entrusted to the third country's company, the words of "the Japanese Study Team", used in the undertaking of His Majesty's Government of Nepal in the Scope of Work, shall be read as "the Japanese Study Team and the Team of aerial photography".
10. The map symbols shall be basically those of SD.
11. All the data, maps and aerial photographs shall not be published unless otherwise agreed upon by SD.
12. Upon the completion of the whole work of the Study, JICA shall keep two (2) sets of the each sheet of the topographic maps, as a token of the friendly cooperation with SD.
13. The Nepalese side earnestly requested to the Japanese side the followings;
  - (1) To accept as many Nepalese counterpart personnel as possible to Japan for facilitating technical transfer in the course of the Study.
  - (2) To provide necessary materials for conducting the Study.
  - (3) To provide appropriate number of vehicles for smooth implementation of the Study.
  - (4) To take consideration to transfer of technology, by providing necessary equipments for conducting the Study.

The Japanese team replied that they would convey the above requests to the Japanese authorities concerned.

Pans

(14)

LIST OF PARTICIPANTS

NEPALESE SIDE

(SURVEY DEPARTMENT)

- |                             |                              |
|-----------------------------|------------------------------|
| 1. MR. BUDDHI N. SHRESTHA   | DIRECTOR GENERAL             |
| 2. MR. PUNYA PRASAD OLI     | ACT. DEPUTY DIRECTOR GENERAL |
| 3. MR. R. P. MARATHA        | CHIEF SURVEY OFFICER         |
| 4. MR. BIJAYA LAL RAJBANSHI | SURVEY OFFICER               |
| 5. MR. K. C. DUTTA          | SURVEY OFFICER               |

JAPANESE SIDE

(JAPANESE STUDY TEAM)

- |                          |        |
|--------------------------|--------|
| 1. MR. HOBORU INOUE      | LEADER |
| 2. MR. KAZUO INABA       | MEMBER |
| 3. MR. MITSUO IWASE      | MEMBER |
| 4. MR. HIROSHI MURAKAMI  | MEMBER |
| 5. MR. SEIICHI KAKINUMA  | MEMBER |
| 6. MR. CHIYUKI NISHIMURA | MEMBER |

(EMBASSY OF JAPAN)

- |                     |                  |
|---------------------|------------------|
| 1. MR. KENZO HIROKI | SECOND SECRETARY |
|---------------------|------------------|

(JICA NEPAL OFFICE)

- |                         |                               |
|-------------------------|-------------------------------|
| 1. MR. MASAHIITO OHYAMA | ASST. RESIDENT REPRESENTATIVE |
|-------------------------|-------------------------------|

*Pans*

*(L)*



SCOPE OF WORK (DRAFT)  
FOR  
TOPOGRAPHIC MAPPING OF LUMBINI ZONE  
IN  
NEPAL  
AGREED UPON BETWEEN  
SURVEY DEPARTMENT  
MINISTRY OF LAND REFORM AND MANAGEMENT  
AND  
JAPAN INTERNATIONAL COOPERATION AGENCY

MARCH TH, 1990

KATHMANDU

---

MR. BUDDHI N. SHRESTHA  
DIRECTOR GENERAL  
SURVEY DEPARTMENT  
MINISTRY OF LAND REFORM  
AND MANAGEMENT  
HIS MAJESTY'S  
GOVERNMENT OF NEPAL(SD)

---

MR. NOBORU INOUE  
LEADER  
THE PRELIMINARY STUDY TEAM  
JAPAN INTERNATIONAL  
COOPERATION AGENCY (JICA)

*B. N. Shrestha*

*INOUE*

## I. INTRODUCTION

In response to the request of His Majesty's Government of Nepal ( hereinafter referred to as "HMG/N" ), the Government of Japan ( hereinafter referred to as "GOJ" ) has decided to implement the Topographic Mapping of Lumbini Zone in Nepal ( hereinafter referred to as "the Study" ), in accordance with the relevant laws and regulations in force in Japan.

Accordingly, the Japan International Cooperation Agency (hereinafter referred to as "JICA"), the official agency responsible for the implementation of the technical cooperation programmes of GOJ, will undertake the Study in close cooperation with the authorities of Nepal.

Survey Department of HMG/N (hereinafter referred to as "SD") shall act as the counterpart body to the Japanese Study Team (hereinafter referred to as "the Team") and also act as the coordinating body with other relevant organizations for the smooth implementation of the Study.

The present document sets forth the Scope of Work for the Study.

## II. OBJECTIVE OF THE STUDY

The objective of the study is;

- (1) To prepare 1/25,000 topographic maps covering the area of approximately 9,000km<sup>2</sup> (see Appendix I).

## III. SCOPE OF THE STUDY

In order to achieve the above mentioned objective, the Study will cover the following items (The technical specifications are as shown in Appendix N).

### 1. Aerial Photography

Aerial Photography shall be taken at the scale of approximately 1/50,000. Setting of air-photo signals shall be done if necessary, prior to commencement of the aerial photography.

### 2. Ground Control Point Survey

Existing ground control points shall be utilized, however, GPS, triangulation, traversing and leveling will be carried out, if necessary.

*Bns.*

*HJ*

3. Pricking  
Pricking on the aerial photographs shall be done in the field, if necessary.
4. Field Identification  
The topographic and land use information shall be identified in the field by using the aerial photographs.  
Administrative boundaries and geographical names shall be collected.
5. Aerial Triangulation  
Aerial Triangulation shall be carried out by analytical block adjustment method.
6. Stereo Plotting and Compilation  
Stereo plotting shall be carried out using stereo plotting instrument at the scale of 1/25,000.  
  
Compilation shall be done on the manuscripts.
7. Field Completion  
Topographic features, land use, vegetation, etc. which cannot be properly identified on the aerial photographs shall be identified in the field and plotted on the compilation sheets.  
Administrative boundaries and geographical names shall also be prepared and verified.
8. Drafting and Printing  
Based on the compiled sheets, scribing shall be carried out on the stable polyester base for five (5) color separation plates.  
Text shall be photo-typed.  
  
Plate making shall be carried out using 1/25,000 combined negatives, and printing shall be carried out by offset method.

#### W. STUDY SCHEDULE

The whole work will be conducted in accordance with the tentative schedule as shown in Appendix I. In case the aerial photography is not completed within the expected period, both sides shall settle the further programmes of the Study.

The detailed work plan and the schedule of each Japanese fiscal year (from April to March) will be settled by both sides prior to the commencement of the works.

*Bns*

*KW*

## V. REPORTS AND FINAL RESULTS

A report in English shall be presented to HMG/N by JICA every fiscal year except the final year, and the final report in English shall be presented upon the completion of the Study.

The final results mentioned in Appendix II will be submitted to HMG/N by JICA. These materials will belong to HMG/N after having completed the whole work.

All maps produced by the Study shall bear at the lower margin the following:

This map was produced under a cooperative undertaking between His Majesty's Government of Nepal and the Government of Japan.

## VI. UNDERTAKING OF HIS MAJESTY'S GOVERNMENT OF NEPAL

1. To facilitate smooth conduct of the Study, HMG/N shall make necessary arrangement;
  - 1) To secure the safety of the Team,
  - 2) To permit the members of the Team to enter, leave and sojourn in Nepal for the duration of their assignment therein, and exempt them from alien registration requirements and consular fees,
  - 3) To exempt the members of the Team from tax, custom duties and other charges on equipment, machinery and other materials brought into Nepal for the implementation of the Study.
  - 4) To exempt the members of the Team from income tax and other charges of any kind imposed on or in connection with any emoluments or allowances paid to the members of the Team for their services in connection with the implementation of the Study.
  - 5) To provide the necessary facilities to the Team for the remittances as well as utilization of funds introduced into Nepal from Japan in connection with the implementation of the Study.
  - 6) To secure permission for entry into private properties for the conduct of the Study.
  - 7) To secure permission for the Team to take all the necessary data and documents, including the diapositives and other aerial photographs, related to the Study out of Nepal to Japan.
  - 8) To provide medical services as needed. Its expenses will be chargeable on the members of the Team.

*Bns*

*Kel*

2. HMG/N shall bear claims, if any arises against the members of the Team resulting from, occurring in the course of, or otherwise connected with the discharge of their duties in the implementation for the Study, except when such claims arise from gross negligence or willful misconduct on the part of the members of the Team.
3. To facilitate smooth conduct of the Study, SD shall take necessary arrangements for the Team as follows, in cooperation with other relevant organizations;
  - 1) To secure permission for the aerial photography and use of airports for the implementation of the Study,
  - 2) To arrange helicopter and/or aircraft for the Team on their expenses,
  - 3) To secure permission for the use of communication facilities including transceivers,
  - 4) To employ labourers and drivers.
4. SD shall, at its own expense, provide the Team with following in cooperation with other related organizations;
  - 1) Available data and information related to the Study,
  - 2) 40-50 man power which includes the technicians, administrator and counterpart personnel,
  - 3) Suitable office space and facilities in Kathmandu.
  - 4) Aerial camera, levels, theodolites, laboratory facilities for aerial photography.
  - 5) Credential or identification cards to the members of the Team,
  - 6) Information of the necessary administrative boundaries and geographical names on the maps, at its full responsibility.

#### M. UNDERTAKING OF JICA

For the implementation of the Study, JICA shall take the following measures, in accordance with the relevant laws and regulations in force in Japan;

1. To dispatch, at its own expense, the Study Team to Nepal, for the field work,
2. To pursue technology transfer for the Nepalese counterpart personnel in the course of the Study,
3. To provide the equipment and machinery for the conduct of the Study, which will remain the property of JICA unless otherwise agreed upon.

*Bns*

*Kel*

W. CONSULTATIONS

JICA and SD shall consult with each other in respect of any matter that may arise from or in connection with the Study.

Banshreshta

KW

APPENDIX I.

TENTATIVE SCHEDULE

ITEM	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	28	29	31	32	33	34	35	36	37	38		
AERIAL PHOTOGRAPHY																																						
GROUND CONTROL POINT SURVEY																																						
PRICKING																																						
FIELD IDENTIFICATION																																						
AERIAL TRIANGULATION																																						
PLOTTING AND COMPILATION																																						
FIELD COMPLETION																																						
DRAFTING AND PRINTING																																						

NOTE : \_\_\_\_\_ WORK IN NEPAL

\_\_\_\_\_ WORK IN JAPAN

*Smith*

*Red*

Appendix II

Final Result

1. Aerial Photography

(1) Original negatives (roll)

(2) Diapositives

(3) Contact paper prints

(4) Index map

2. Topographic Mapping

(1) Ground control point survey field books and results

(2) Pricked and annotated photographs

(3) Aerial triangulation results

(4) Original manuscripts

(5) Color separation combined sheets

(6) 1/25,000 topographic maps in English (1,000 copies)

*Bns*

*Kul*



Technical Specifications

1. Topographic Mapping:

"A" class mapping specifications in the technical Manual of Overseas Surveying of JICA will be applied with the exception of some subjects and some areas, such as obscure areas on photographs, generalized building area, periphery of road in the suburbs and in rural area, and it will be resolved in consultation with each other.

2. Contour Lines:

10 meters contour intervals in hills and supplementary 5 meters intermediate contour line for flat area.

3. Format:

( 12.5km X 12.5km )

4. Number of Colors:

5 colors

5. Projection

Universal Transverse Mercator modified  
3' Zone, Central meridian 84' E Longitude.

*Bns*

*KW*







JICA